

Math 0362

Factor Completely Final Exam Practice

1.  $2x^2 - 5x + 3$

$$(2x - 3)(x - 1)$$

$$-3x - 2x = -5x$$

$$(2x - 3)(x - 1)$$

2.  $\frac{3x^3 - 18x^2 + 15x}{3x}$

$$3x(x^2 - 6x + 5)$$

$$3x(x - 5)(x - 1) \checkmark$$

3.  $4x^2 - 81$

$$(2x + 9)(2x - 9)$$

4. Solve

$$x^2 + 3x - 10 = 0$$

$$(x + 5)(x - 2) = 0$$

$$x + 5 = 0$$

$$-5 - 5$$

$$x = -5$$

$$x - 2 = 0$$

$$+2 +2$$

$$x = 2$$

Math 0362

Factor Completely

$$2x^2 - 5x + 3$$
  

$$(2x - 3)(x - 1)$$

$$-3x - 2x = -5x$$

$$(2x-3)(x-1)$$

2.

$$\frac{3x^3}{3x} - \frac{18x^2}{3x} + \frac{15x}{3x}$$

$$3x(x^2 - 6x + 5)$$

$$3x(x-5)(x-1)$$



3.

$$4x^2 - 81$$

$$(2x + 9)(2x - 9)$$

4. Solve

$$x^2 + 3x - 10 = 0$$

$$(x + 5)(x - 2) = 0$$

$$x + 5 = 0$$

$$\begin{array}{r} x+5=0 \\ -5-5 \\ \hline \end{array}$$

$$X = -5$$

$$x - 2 = 0$$

+2 +2

$X=2$

5. Find domain

$$f(x) = \frac{3x+2}{x-7}$$

$$\begin{array}{r} x-7 \neq 0 \\ +7 \quad +7 \\ \hline x=7 \end{array}$$

$$(-\infty, 7) \cup (7, \infty)$$

6. Multiply

$$\frac{x^2-49}{x^2-3x-28} \cdot \frac{x+4}{x}$$

$$\frac{\cancel{(x-7)}(x+7)}{\cancel{(x+4)}(x-7)} \cdot \frac{\cancel{x+4}}{x}$$

$$\frac{x+7}{x}$$

$$7. \quad \frac{6}{6} \cdot \frac{x+2}{x} - \frac{x-5}{6x}$$

$$\frac{-6x+12 - x+5}{6x}$$

$$\boxed{\frac{-7x+17}{6x}}$$

8.

$$\frac{a}{a-8} \cdot \frac{a-6}{a-4}$$

$$a(a-4) = -6(a-8)$$

$$a^2 - 4a = -6a + 48$$

$$+6a - 48 + 6a - 48$$

$$a^2 + 2a - 48 \geq 0$$

$$(a+8)(a-6)$$

$$a+8=0$$

$$a-6=0$$

$$\underline{-8 \quad -8}$$

$$\underline{+6 \quad +6}$$

$$\boxed{a=-8}$$

$$\boxed{a=6}$$

9. A conveyor belt moves aluminum in 2 minutes  
 Another conveyor belt moves aluminum in 9 minutes  
 How long does it take if both conveyor belts work together?

Look at "times"

$$\frac{\text{Multiply}}{\text{Add}} = \frac{2 \times 9}{2 + 9} = \boxed{\frac{18}{11}} \checkmark$$

10.  $f(x) = x^2 - 3x + 1$ ; Find following

$$\begin{aligned} a) f(3) &= 3^2 - 3(3) + 1 \\ 9 - 9 + 1 &= \boxed{1} \end{aligned}$$

$$b) f(0) = 0^2 - 3(0) + 1 = \boxed{1}$$

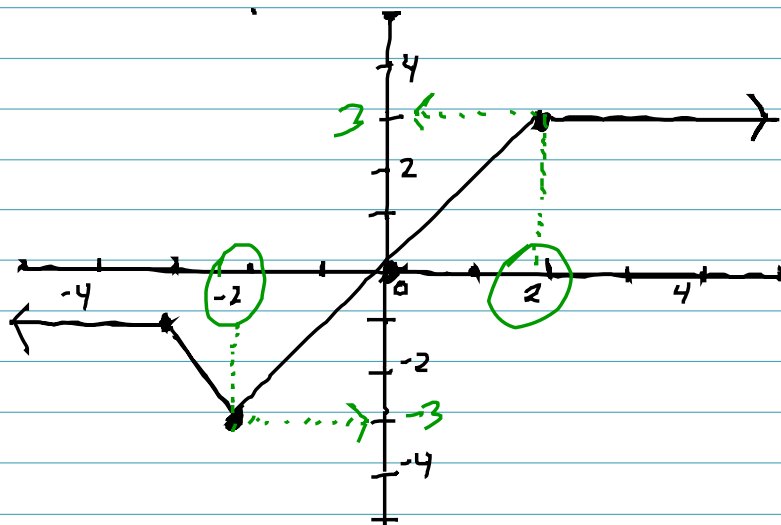
$$\begin{aligned} c) f(-1) &= (-1)^2 - 3(-1) + 1 \\ 1 + 3 + 1 &= \boxed{5} \end{aligned}$$

$$\begin{aligned} d) f(-2) &= (-2)^2 - 3(-2) + 1 \\ 4 + 6 + 1 &= \boxed{11} \end{aligned}$$

11. Use graph to find

$$f(2) = 3 \checkmark$$

$$f(-2) = -3 \checkmark$$



12. Solve by substitution

$$3x - 7y = 17 \quad y = x - 3$$

$$3x - 7(x - 3) = 17$$

$$3x - 7x + 21 = 17$$

$$-4x + 21 = 17$$

$$\begin{array}{r} -21 \quad -21 \\ \hline -4x = -4 \end{array}$$

$$\frac{-4x}{-4} = \frac{-4}{-4}$$

$$x = 1$$

13. Solve by Addition

$$y = 7 + 3x \quad 6x - 2y = -14$$

$$\begin{array}{r} -3x \quad -3x \\ 2(-3x + 7 = 7) \quad -6x + 14 = 14 \\ 6x - 2y = -14 \quad \underline{6x - 2y = -14} \\ \hline \end{array}$$

Everything cancels

✓ Infinite solutions

14. Solve by graphing

$$x + y = 8$$

ignore x | ignore y

$$y = 8$$

$$x = 8$$

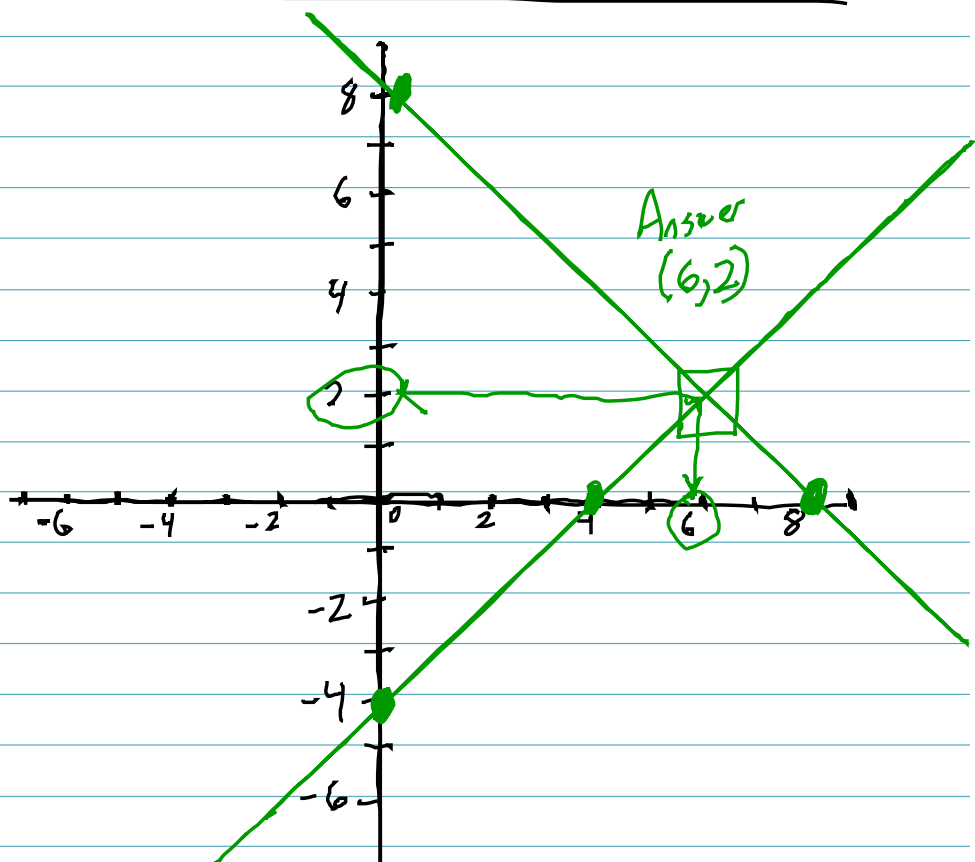
$$x - y = 4$$

ignore x | ignore y

$$\begin{array}{r} -y = 4 \\ \hline -1 \quad -1 \end{array}$$

$$y = -4$$

$$\begin{array}{r} \text{ignore } y \\ \hline x = 4 \end{array}$$



15. Find equation of line passing through  $(-1, 8)$  and  $(0, 3)$

1) Find Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 8}{0 - (-1)} = \frac{-5}{1} = -5$$

2) Find b

$$y = mx + b$$

$$3 = -5(0) + b$$

$$0 + b$$

$$3 = b$$

3) replace m and b

$$y = mx + b$$

$$y = -5x + 3$$

16. y varies directly as x. Find constant K if  $y=2$  when  $x=12$

multiply

$$y = Kx$$

$$\frac{2}{12} = \frac{K(12)}{12}$$

~~12=K~~

$$\frac{1}{6} = K$$

$$y = \frac{1}{6}x$$

17. Solve

$$|x - 6| + 2 = 4$$

$$\underline{-2 \quad -2}$$

$$|x - 6| = 2 \quad \text{opposite}$$

$$x - 6 = 2$$

$$\underline{+6 \quad +6}$$

$$x = 8$$

$$x - 6 = -2$$

$$\underline{+6 \quad +6}$$

$$x = 4$$

18.

$$|x + 8| \geq 13$$

As Is ✓

$$x + 8 \geq 13$$

$$\underline{-8 \quad -8}$$

$$x \geq 5$$

opposite ✓

$$x + 8 \leq -13$$

$$\underline{-8 \quad -8}$$

$$x \leq -21$$

$$\leftarrow \boxed{-21} \quad \boxed{5} \rightarrow$$

$$(-\infty, -21] \cup [5, \infty)$$

19. Graph

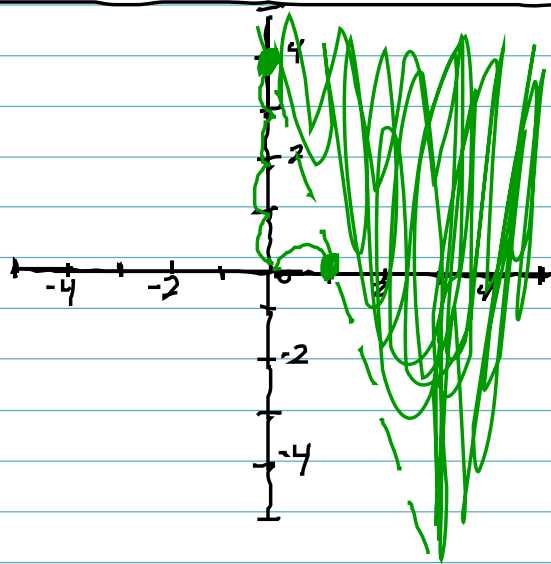
$$4x + y > 4$$

$$\frac{-4x}{-4x} \quad \frac{-4}{-4x}$$

$$y > -4x + 4$$

slope =  $-4 = \frac{-4}{1}$  down 4 right 1

y-intercept = 4 start



20.

$$\sqrt[3]{-8x^{15}} \quad \frac{15}{3} = 5$$

$$-2x^5$$

21.

$$\sqrt{\frac{5x^4}{16y^2}}$$

$$\frac{x^2 \sqrt{5}}{4y}$$

22.

$$6\sqrt{75} - 2\sqrt{20} - 2\sqrt{27}$$

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ \sqrt{25}\sqrt{3} & \sqrt{4}\sqrt{5} & \sqrt{9}\sqrt{3} \\ \downarrow & \downarrow & \downarrow \\ 5\sqrt{3} & 2\sqrt{5} & 3\sqrt{3} \end{array}$$

$$30\sqrt{3} - 4\sqrt{5} - 6\sqrt{3}$$

$$24\sqrt{3} - 4\sqrt{5}$$

23.

$$\sqrt{4x-7} - 1 = 4$$

$$\sqrt{4x-7} = 5$$

$$4x-7 = 25$$

$$4x = 32$$

$$x = 8$$

$$24. \quad \sqrt[3]{3x} = 3$$

$$\frac{3x}{\frac{1}{3}} = \frac{27}{\frac{1}{3}}$$

$$x = 9$$

25.

$$(8-4i) + (8+3i)$$

$$16 - 1i$$

26.

$$(7-4i) - (8-3i)$$

$$7-4i - 8+3i$$

$$-1 - 1i$$

27.

$$(3-2i)^2 (3-2i)$$

$$9 - 6i - 6i + 4i^2$$

$$9 - 12i - 4$$

$$5 - 12i$$



28.

$$3i(5-8i)$$

$$15i - 24i^2 \rightarrow \boxed{15i + 24}$$

29. Quadratic

$$x^2 - x - 1 = 0$$

$$a=1 \quad b=-1 \quad c=-1$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-1)}}{2(1)}$$

$$\frac{1 \pm \sqrt{1+4}}{2} = \boxed{\frac{1 \pm \sqrt{5}}{2}} \quad \checkmark$$

30.

$$x^2 + 6x + 13$$

$$a=1 \quad b=6 \quad c=13$$

$$\frac{-6 \pm \sqrt{6^2 - 4(1)(13)}}{2(1)}$$

$$\frac{-6 \pm \sqrt{36 - 52}}{2}$$

$$\frac{-6 \pm \sqrt{-16}}{2} \rightarrow \frac{-6 \pm 4i}{2} = \boxed{-3 \pm 2i}$$